

Assignment 3, Math 240, Fall 2005

Due: September 8. Value: 16 pts.

(Note, incidentally, that there will be a take-home test distributed September 8, due September 13.)

Based on September 6 material

- §1.6 (p 85): 22. Prove your answer.
- §1.8 (p 109): 12abd. Explain your answers. Note that all functions have a domain and codomain of the *integers*. Your answers will not necessarily be the same as if they were functions on the real numbers.

For part (d.), note that $\lceil x \rceil$ stands for the *ceiling* of x , which is the “rounding up” function. Formally, $\lceil x \rceil$ is defined as the smallest integer that is at least x . Examples include: $\lceil 2.2 \rceil = 3$, $\lceil -1.2 \rceil = -1$, and $\lceil 5 \rceil = 5$.

- §1.8 (p 109): 13abd. Explain your answers.
- §3.2 (p 237): 36. You may assume that the two countable sets are disjoint (i.e., $A \cap B = \emptyset$).
- **a.** Suppose we spoke in a language whose alphabet included only a and b . Prove that the set of all possible words in our language is countable. This set includes $a, aa, aaa, \dots, ab, aba, \dots, b, ba, \dots, bbb, \dots$
- **b.** What if your alphabet included 25 letters? You don’t need to prove your answer formally, but explain your answer.